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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/919,717	08/01/2001	Kenneth J. Susnjara	21195	5392

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EXAMINER

SHENG, TOM V

ART UNIT	PAPER NUMBER
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2673

DATE MAILED: 07/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/919,717

Applicant(s)

SUSNJARA ET AL.

Examiner

Tom V Sheng

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 6-7, 9, 11, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fernie et al. (US Patent 5933125).

As to claims 1 and 11, Fernie teaches a virtual reality viewing system (virtual environment display apparatus; figure 2; column 4, lines 16-40) comprising:

means responsive to selective motion of a viewer operable (head position sensor 15a, head acceleration sensor 15c and/or head velocity sensor 15b) to generate signals corresponding to said motions (actual head position output signal 11) providing a sequence of viewing perspectives (the steps are done repeatedly; column 2, lines 16-20);

means for projecting probable subsequent viewing perspectives that will occur in subsequent time intervals (next head or helmet position predicted by a head position processor 10 based on actual position and the measurement of the head acceleration and/or head velocity; column 4, lines 24-27);

means for generating images corresponding to said probable subsequent viewing perspectives (by the computer image generator 12); and

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means for displaying said images to said viewer as current viewing perspectives (by display 20).

Fernie teaches detecting head position/orientation repeatedly as above, and since the transport delay is 100 ms (column 3, line 65, to column 4, line 2), the time interval between measurements can be as small as 100 ms, as claimed selected time intervals. Fernie does not specifically teach a means for measuring an increase in magnitude of each of said signals (actual head positions) at selected time intervals. On the other hand, Fernie's head angular acceleration sensor or head velocity sensor inherently reads on claimed means for measuring an increase in magnitude of each of said signals at selected time intervals, since either one measure changes (changes of changes as well) in head position over time.

Fernie teaches predicting head position based on an actual head position and the measurement of the head acceleration and/or head velocity (column 4, lines 24-32); however he does not teach means for generating a spline corresponding to the magnitudes of said signals at said selected time intervals. On the other hand, one of ordinary skill in the art would recognize from basic Newtonian dynamics (velocity equals change in position over time; acceleration equals change in velocity over time; and more accurate as time interval between measurements getting smaller) that an extrapolation slope could be determined simply based on two consecutive head positions and the respective time interval. More advantageously, the slope would be even more accurate as the velocity and/or acceleration of the last actual head position is measured and incorporated. Thus, the use of a head angular acceleration sensor

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and/or head angular velocity sensor actually reflects an extrapolation of head position over time. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Fernie's predicting method by using a spline based on head positions at selected time intervals only, since this is just a variation on the use of acceleration and/or velocity sensors.

As to claim 2, Fernie's head position sensor 15a, head velocity sensor 15b, or head acceleration sensor 15c reads on claimed sensor means.

As to claim 6, Fernie's head position processor is inherently a computer.

As to claim 7, Fernie's sensors inherently respond to respective motions in the x, y, and z directions since the head movement is 3-dimensional in nature.

As to claim 9, Fernie's display 20 is head-mounted.

As to claims 14 and 15, the selection of time interval determines the number of samples that can be measurement within the course of a head movement (figure 1; about 400 ms). The optimal value can be empirically determined and thus not a patentively distinct feature.

3. Claims 3-5, 8, and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fernie as applied to claims 1, 2, and 11 above, and further in view of Fateh et al. (US Patent 6184847 B1).

As to claims 3 and 12, Fernie is silent as to the particular nature of the sensor means. Fateh teaches a head-mounted virtual display, which includes a head-tracker that senses the direction the user is facing (column 2, lines 52-57). He further teaches

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that a variety of approaches can be used in head tracking (column 4, lines 38-39). He teaches the use of ultrasonic medium (column 5, lines 13-20) that reads on claimed ultrasonic sensors. Applicants also acknowledged that the different types of sensors used for providing position information are well known in the art. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to incorporate Fateh's ultrasonic transmitter/receiver in Fernie's invention, thus providing a proven method in head position measurement.

As to claims 4 and 13, Fateh's teaching of a magnetic sensor (column 4, lines 39-45) reads on claimed magnetic sensors.

As to claim 5, Fateh's teaching of photodiodes on the head-mounted display (column 4, lines 59-65) reads on claimed photo-optical pulse encoders.

As to claim 8, Fateh's user nodding in the forward or backward motion, downward or upward motion, or side-to-side motion read on claimed rotary and linear motion.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fernie as applied to claim 1 above, and further in view of Ishibashi et al. (US Patent 6215461 B1).

As to claim 10, rejection as to claim 1 is similarly applied. Moreover, Fernie teaches the applicability of telepresence systems, which use image sensors such as cameras mounted on head slaved gimbal system (column 5, lines 12-19). As further support, Ishibashi teaches a remote viewing system comprising claimed "a camera

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disposed at a site remote from a viewer, operable to train on an environment to be virtually viewed" (figure 1; camera system 1 controlled by HMD 2 for viewing the shot images SV; column 3, lines 7-24), and "means for training said camera generating images corresponding to said probable subsequent viewing perspectives" (figure 5B; platform 507 supports shaft 508 to which mounted cameras may rotate up/down and rotary table 509 that may rotate laterally; column 4, lines 12-29). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made incorporate Ishibashi's remote viewing system into modified Fernie's viewing apparatus, thus allowing increased viewing stability by reducing latency associated between viewer head movement and update of camera image.

Response to Arguments

5. Applicant's arguments filed on 12/24/2003 have been fully considered but they are not persuasive.

The applicant argues that Fernie uses only the current head position to create an image, whereas the present invention does not use the current head position but rather readings related to "motions" of head, i.e., direction, velocity and acceleration. The examiner disagrees as first the present invention has to necessary use the head position as well as direction, velocity and acceleration to predict the next head position. Second, Fernie also uses acceleration and/or velocity in order to predict the next head position. Please see the more precisely presented arguments in rejection of claims 1 and 11 above.

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Fernie has the extra feature of adding an offset to better prevent disorientation that the present invention does not have; however, this should not affect the effectiveness of Fernie as a prior arts.

Further, the similarity between Newtonian dynamics the use of a spline of motions exists since both relates to changes of position over time. Please see rejections of claims 1 and 11 above.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom V Sheng whose telephone number is (703) 305-6708. The examiner can normally be reached on 8:30am - 5:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (703) 305-4938. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Sheng
July 1, 2004


KENT CHANG
PRIMARY EXAMINER